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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

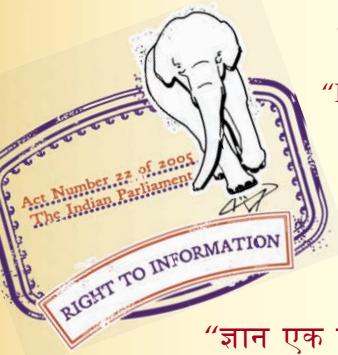
“Step Out From the Old to the New”

IS 9011 (1978): Specification for Skip Suspension Gear for Winding in Mines [MED 8: Mining Techniques and Equipment]

“ज्ञान से एक नये भारत का निर्माण”

Satyanaaranay Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”





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Indian Standard

# SPECIFICATION FOR

## SKIP SUSPENSION GEAR FOR WINDING IN MINES

**1. Scope** — Covers the requirements for suspension gear used for suspension of skips or cages for winding purposes in mines without using bridle chains.

**1.1** This standard does not cover the requirements of rope cappels and safety detaching hooks which shall conform to the requirements of IS : 7587 (Part II)-1975 'Specification for cage suspension gear for winding in mines; Part II Capples' and IS : 3970-1967 'Specification for safety detaching hooks used in mines' respectively.

**2. Terminology** — For the purpose of this standard, a typical arrangement of suspension gear is shown in Fig. 1.

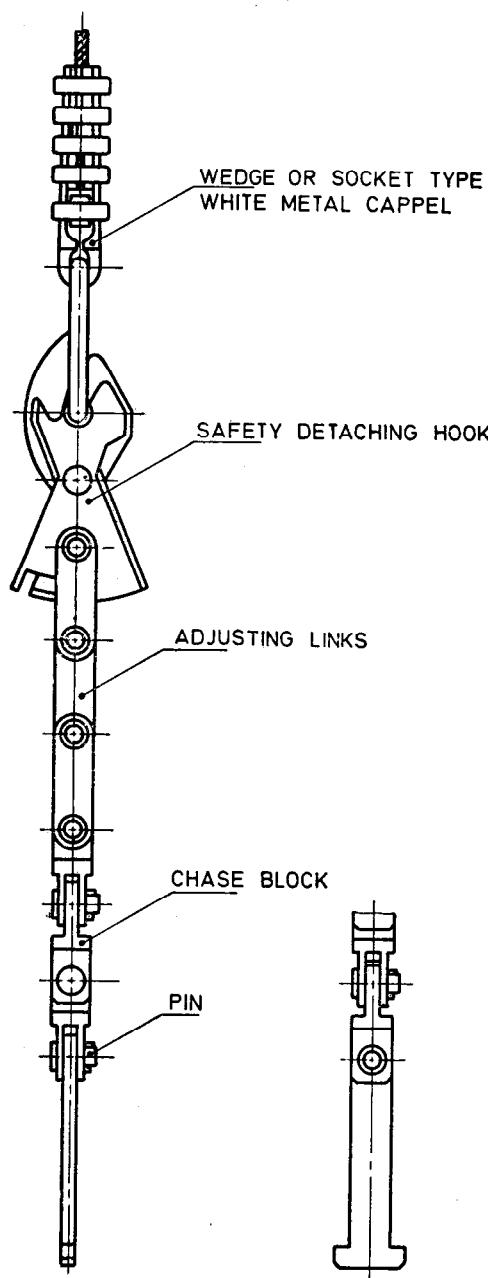


FIG. 1 NOMENCLATURE OF SUSPENSION GEAR

Adopted 8 December 1978

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**2.1 Plate Link (King Bar)** — The link bar used in suspension gear for connection of the skip/cage to the other components of suspension gear.

**2.2 Chase Block** — An attachment used to connect plate link to the safety hook through adjusting links.

**2.3 Static Working Load (Safe Working Load)** — It consists of the aggregate load suspended on suspension gear and shall include the weight of suspension gear.

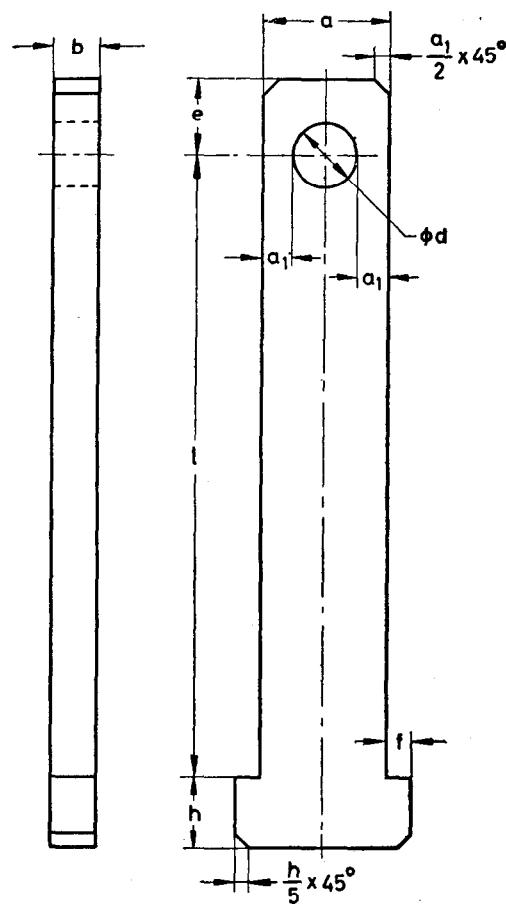
**2.4 Proof Load** — The non-destructive tensile load to which the components are subjected to in the finished condition.

**2.5 Breaking Load** — The destructive tensile load to which the components are subjected to in the finished condition.

**2.6 Factor of Safety** — The factor of safety is the ratio between the breaking load and the static working load as defined in 2.5 and 2.3 respectively.

### 3. Dimensions

#### 3.1 Plate Link

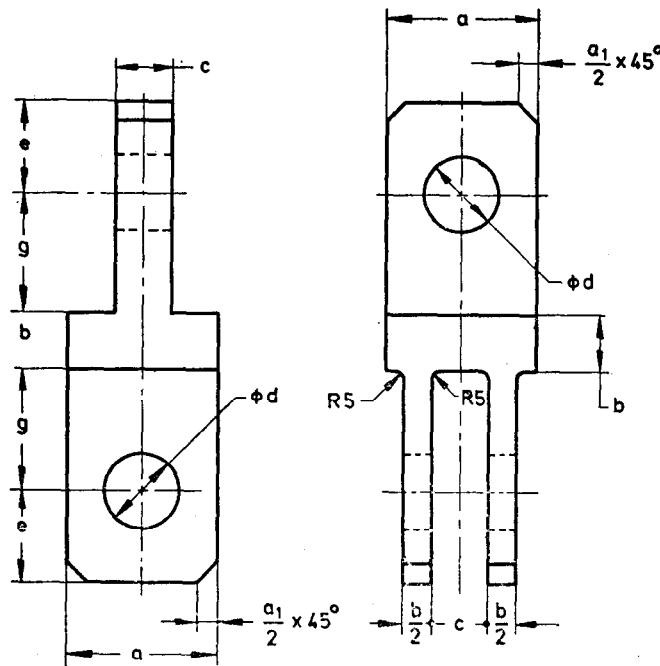


All dimensions in millimetres.

Safe Working Load		<i>a</i>	<i>a</i> <sub>1</sub>	<i>b</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>h</i>	<i>I</i>
kN	( $\approx t$ )				H7				
50	5	100	25	36	50	60	40	55	500
80	8	115	30	38	55	75	45	65	550
100	10	130	35	40	60	85	50	70	600
120	12	150	40	45	70	95	55	75	650
150	15	165	45	50	75	100	60	80	700

3.1.1 If agreed between the purchaser and the manufacturer, the plate link may be of rectangular shape having hole at the bottom also of diameter 'd' and at a distance of 'e' from the bottom.

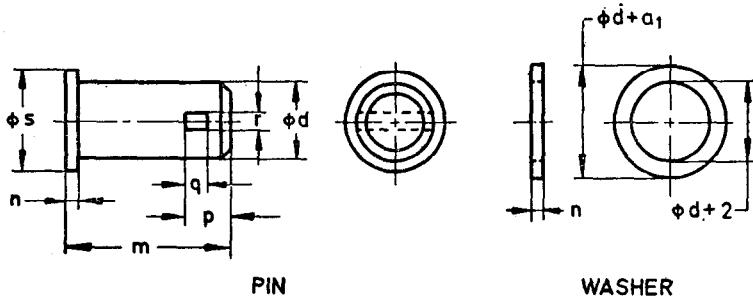
### 3.2 Chase Block



All dimensions in millimetres.

Safe Working Load		$a$	$a_1$	$b$	$c$	$d$	$e$	$g$
kN	( $\approx t$ )					H7		
50	5	100	25	36	37	50	60	80
80	8	115	30	38	39	55	75	95
100	10	130	35	40	41	60	85	110
120	12	150	40	45	46	70	95	115
150	15	165	45	50	51	75	100	125

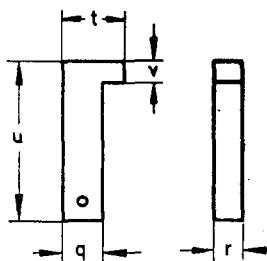
### 3.3 Pin and Washer



All dimensions in millimetres.

Safe Working Load		$d$	$m$	$n$	$p$	$q$	$r$	$s$	$a_1$
kN	( $\approx t$ )	h6							
50	5	50	120	8	30	15	10	66	25
80	8	55	132	9	36	18	12	75	30
100	10	60	144	10	42	21	14	80	35
120	12	70	164	12	48	24	16	90	40
150	15	75	180	12	54	27	18	100	45

## 3.4 Key



All dimensions in millimetres.

Safe Working Load		q	r	t	u	v
kN	( $\approx t$ )					
50	5	15	10	22	65	6
80	8	18	12	27	75	8
100	10	21	14	30	85	10
120	12	24	16	36	95	12
150	15	27	18	42	105	14

## 4. Material

a) 11Mn2 of IS : 4432-1967 'Specification for case hardening steel', or  
 b) 20Mn2 of IS : 1570-1961 'Schedules for wrought steels for general engineering purposes'.

**4.1** The steel used in the manufacture of components of suspension gear shall be produced by acid or basic open-hearth process, acid or basic electric process or acid converter process. It shall be fully killed and its content of sulphur and phosphorus shall be restricted to 0.05 percent individually and both together shall not exceed 0.09 percent.

**5. Designation** — A skip suspension gear of 50 kN safe working load and conforming to this standard shall be designated as:

Suspension Gear 50BL IS : 9011

**Note** — The letters 'BL' indicate that the suspension gear do not employ bridle chains for the suspension of the skips or cages.

**6. Heat Treatment** — All components of the suspension gear, after completing all forging operations, shall be either normalized or normalized and tempered or hardened and tempered or refined and hardened and tempered at temperatures given below to obtain optimum mechanical properties:

Designation of Steel	Normalizing Temperature °C	Hardening Temperature °C	Tempering Temperature °C	Quenching Agent
(1)	(2)	(3)	(4)	(5)
11Mn2	870-910	870-910	550-660	Water or oil
20Mn2	860-900	860-900	550-660	Water or oil

## 7. Manufacture

**7.1** All components of suspension gear shall be of sound construction, free from defects like cracks, roughness, deep toolmarks, deep notches, etc, and shall be of good workmanship. There shall be no sharp reduction in cross section or sharp radius.

**7.2** The recommended hot working temperatures are as follows:

Designation of Steel	Temperature °C
11Mn2	1100 to 850
20Mn2	1200 to 850

**7.3** Each component shall be manufactured by either forging or machining from slabs or bars. Billets, blooms, slabs and bars used for the manufacture of the component shall be free from cracks, surface flaws, laps and other surface defects which may result in defects in forgings made therefrom.

**7.3.1** No welding of any kind shall be done during the process of manufacture of any component.

**7.4** All plates, sections and bars shall be well and cleanly rolled to the dimensions specified and shall be sound and free from flaws, laminations, cracks and other defects.

**7.5** Where flame cutting of steel plate is necessary suitable margin shall be provided for removal by final machining to produce a finished surface free from irregularities and decarburization zones.

**7.5.1** Prior to final finish and subsequent to flame cutting, machining and forging, all components shall be hardened and tempered as required. The components shall be machined from solid as far as possible.

## 8. Marking

**8.1** *Identification Marking* — Each component of the suspension gear shall be permanently and legibly marked with the manufacturer's identification mark and the safe working load at a non-wearable position of the part.

**8.2** The stamps used for marking shall be of 5 mm size for components of 50 kN safe working load and shall be of 6 mm size for components of safe working load above 50 kN.

**8.3** *ISI Certification Marking* — Details available with the Indian Standards Institution.

## 9. Testing

**9.1** *Destruction Test* — Notwithstanding any provision for statutory requirements, each prototype of the component shall be tested to destruction to ensure a minimum factor of safety of 10 in the component.

**9.2** *Proof Test* — Each finished component of suspension gear, separately or collectively, shall be subjected to a proof load of three times the safe working load and shall withstand the test without any permanent deformation or set. Each component shall be separately and thoroughly examined for cracks after proof load test, visually and by means of other suitable devices. Magnetic crack detection test, gammaray, X-ray and ultrasonic tests shall be conducted as required.

**10. Certificate of Test** — The manufacturer shall provide a certificate of test with each consignment of different items of suspension gear or with individual items if the purchaser so specifies, giving the following information:

- a) Manufacturer's name,
- b) Material,
- c) Distinguishing mark ( to enable the particular item to be identified ),
- d) Proof load applied,
- e) Safe working load,
- f) Factor of safety ( as determined by destruction test on prototype ),
- g) Details of heat treatment adopted,
- h) Report of examination and stamps of examiners,
- j) A declaration that the item supplied comply in all respect with the standard,
- k) Details of packing before despatch, and
- m) Results of test(s) done on each component for detection of cracks.

## 11. Packing

**11.1** All components of the suspension gear shall be supplied with a coat of anti-corrosive dressing on them.

**11.2** All components of the suspension gear shall be packed suitably to avoid damage in transit.



**AMENDMENT NO. 1**

**MAY 1986**

**TO**

**IS : 9011 - 1978 SPECIFICATION FOR SKIP  
SUSPENSION GEAR FOR WINDING IN MINES**

*(Page 1, Fig. 1) — Substitute the figure given on page 2 for the existing figure.*

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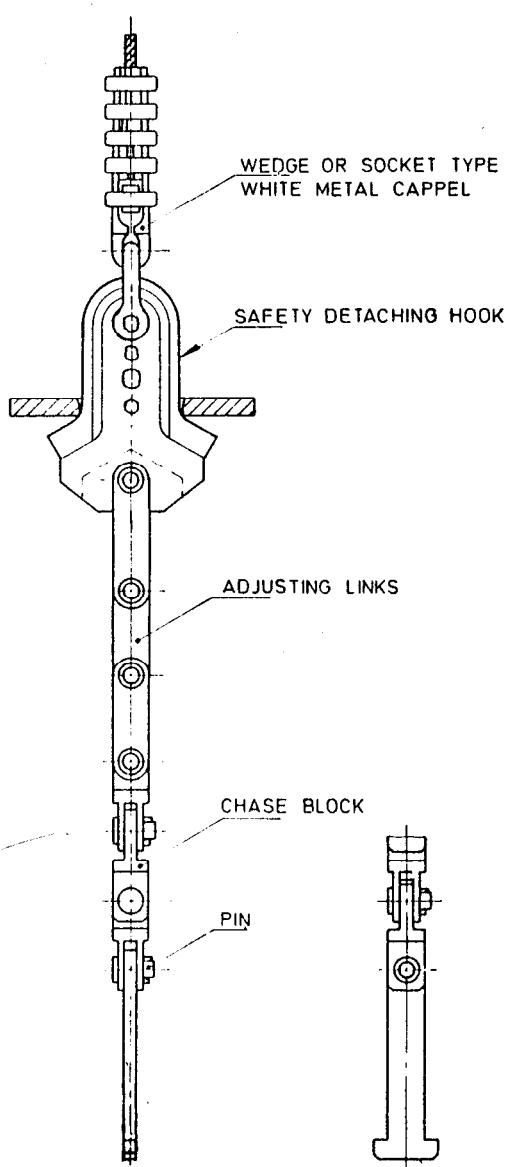


FIG. 1 NOMENCLATURE OF SUSPENSION GEAR